ENVIRONMENTAL PROTECTION COMMISSION[567]

Notice of Intended Action

Pursuant to the authority of Iowa Code sections 455B.105 and 455B.173, the Environmental Protection Commission hereby gives Notice of Intended Action to amend Chapter 61, "Water Quality Standards," Iowa Administrative Code.

The proposed amendment to the table of criteria for chemical constituents will:

- Change the current numerical criteria for 20 chemical parameters to protect aquatic life for the following use designations: Class B(WW–1), Class B(WW–2), and Class B(WW–3).
- Change current numerical criteria for 42 chemical parameters to protect human health for Class HH – Human Health.
- Add the chemical parameter aldrin to protect aquatic life and human health.

The 20 chemical parameters to protect aquatic life for the Class B(WW–1), Class B(WW–2), and Class B(WW–3) designations include: arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, zinc, cyanide, chlordane, 4,4–DDT, endosulfan, heptachlor, heptachlor epoxide, polychlorinated biphenyls (PCBs), toxaphene, aluminum, and total residual chlorine.

The 42 parameters to protect human health for the Class HH designation include: antimony, arsenic (III), benzene, benzo(a)Pyrene, bromoform, carbon tetrachloride, chlordane, chlorobenzene, chlorodibromomethane, cyanide, 4,4–DDT, para–dichlorobenzene, 3,3–dichlorobenzidine, dichlorobromomethane, 1,2–dichloroethane, 1,1–dichloroethylene, 1,2–trans–dichloroethylene, 1,2–dichloropropane, bis(2–ethylhexyl)phthalate, dieldrin, 2,3,7,8–TCDD (dioxin), endosulfan, endrin, ethylbenzene, heptachlor, heptachlor epoxide, hexachlorobenzene, gamma–BHC (lindane), hexachlorocyclopentadiene, nickel, polynuclear aromatic hydrocarbons (PAHs), pentachlorophenol (PCP), polychlorinated biphenyls (PCBs), phenols, selenium, tetrachlorethylene, thallium, toluene, toxaphene, trichloroethylene (TCE), vinyl chloride, and zinc.

The proposed amendment will revise the current criteria for the chemical parameters listed above to reflect the latest scientific information and Environmental Protection Agency guidance.

Additional information on Iowa's water quality standards and the Department's rules can be found on the Department's Web site at http://www.iowadnr.com/water/standards/index.html.

Any person may submit written suggestions or comments on the proposed amendment through July 10, 2007. Such written material should be submitted to Adam Schnieders, Iowa Department of Natural Resources, Wallace State Office Building, 502 East 9th Street, Des Moines, Iowa 50319–0034; fax (515)281–8895; or by E–mail to adam.schnieders@ dnr.state.ia.us. Persons who have questions may contact Adam Schnieders at (515)281–7409.

Persons are invited to present oral or written comments at the public hearings which will be held:

June 14, 2007	Municipal Utilities Conference Room
11 a.m.	15 W. Third St.
	Atlantic, Iowa
June 14, 2007	Cherokee Community Center
7 p.m.	530 W. Bluff St.
	Cherokee, Iowa
June 19, 2007	Farmers and Merchants Savings Trust
11 a.m.	101 E. Main St.
	Manchester, Iowa
June 19, 2007	Clear Lake Community Meeting Room
7 p.m.	15 N. Sixth St.
	Clear Lake, Iowa
June 21, 2007	Washington Community Y
7 p.m.	121 E. Main St.
	Washington, Iowa
June 26, 2007	Wallace State Office Building
1 p.m.	Fifth Floor Conference Rooms
	502 East 9th St.
	Des Moines, Iowa

Any person who intends to attend a public hearing and has special requirements such as those related to hearing or mobility impairments should contact the Department of Natural Resources to advise of any specific needs.

This amendment is intended to implement Iowa Code chapter 455B, division III, part 1.

The following amendment is proposed.

Amend subrule **61.3(3)**, Table 1, Criteria for Chemical Constituents, as follows:

TABLE 1: Criteria for Chemical Constituents

(all values in micrograms per liter as total recoverable unless noted otherwise)

Human health criteria for carcinogenic parameters noted below were based on the prevention of an incremental cancer risk of 1 in 100,000. For parameters not having a noted human health criterion, the U.S. Environmental Protection Agency has not developed final national human health guideline values. For noncarcinogenic parameters, the recommended EPA criterion was selected. For Class C waters, the EPA criteria for fish and water consumption were selected using the same considerations for carcinogenic and noncarcinogenic parameters as noted above. For Class C waters for which no EPA human health criteria were available, the EPA MCL value was selected.

		Use Designations							
Parameter		B(CW1)	B(CW2)	B(WW–1)	B(WW–2)	B(WW–3)	B(LW)	C	HH
Alachlor	MCL	—	—	—	—	—	—	2	—
Aldrin	Acute	—	—	3	3	3	—	—	—
	Human Health — Fish	—	—	—	—	—	—	—	.00050[e]
	Human Health + — F & W	—	—	—	—	—	—	—	.00049[f]
Aluminum	Chronic	87	—	~~388~~ 87	~~773~~ 87	~~773~~ 87	748	—	—
	Acute	1106	—	~~4539~~ 750	~~9035~~ 750	~~9035~~ 750	983	—	—
Antimony	Human Health — Fish	—	—	—	—	—	—	—	640[e]
	Human Health + — F & W	—	—	—	—	—	—	—	~~14~~ 5.6[f]
Arsenic (III)	Chronic	200	—	~~200~~ 150	~~1000~~ 150	~~1000~~ 150	200	—	—
	Acute	360	—	~~360~~ 340	~~1800~~ 340	~~1800~~ 340	360	—	—
	Human Health — Fish	—	—	—	—	—	—	—	~~50[e]~~ 1.4[e] [g]
	Human Health — F & W	—	—	—	—	—	—	—	.18[f] [g]
Asbestos	Human Health — F & W	—	—	—	—	—	—	—	7[a] [f]
Atrazine	MCL	—	—	—	—	—	—	3	—
Barium	Human Health + — F & W	—	—	—	—	—	—	—	1000[f]

Benzene	Human Health — F & W	—	—	—	—	—	—	—	~~12~~ 22[f]
	Human Health — Fish	—	—	—	—	—	—	—	~~712.8~~ 510[e]
Benzo(a)Pyrene	Human Health — F & W	—	—	—	—	—	—	—	~~.044~~ .038[f]
	Human Health — Fish	—	—	—	—	—	—	—	.18[e]
Beryllium	MCL	—	—	—	—	—	—	4	—
Bromoform	Human Health — F & W	—	—	—	—	—	—	—	43[f]
	Human Health — Fish	—	—	—	—	—	—	—	~~3600~~ 1400[e]
Cadmium	Chronic	1	—	~~15~~ .27[h]	~~25~~ .27[h]	~~25~~ .27[h]	1	—	—
	Acute	4	—	~~75~~ 2.13[h]	~~100~~ 2.13[h]	~~100~~ 2.13[h]	4	—	—
	Human Health + — Fish	—	—	—	—	—	—	—	168[e]
	MCL	—	—	—	—	—	—	5	—
Carbofuran	MCL	—	—	—	—	—	—	40	—
Carbon Tetra–chloride	Human Health — F & W	—	—	—	—	—	—	—	~~2.5~~ 2.3[f]
	Human Health — Fish	—	—	—	—	—	—	—	~~44.2~~ 16[e]
Chlordane	Chronic	.004	—	~~.004~~ .0043	~~.15~~ .0043	~~.15~~ .0043	.004	—	—
	Acute	2.5	—	~~2.5~~ 2.4	~~2.5~~ 2.4	~~2.5~~ 2.4	2.5	—	—
	Human Health — Fish	—	—	—	—	—	—	—	~~.006~~ .0081[e]
	Human Health — F & W	—	—	—	—	—	—	—	~~.021~~ .008[f]
Chloride	MCL	—	—	—	—	—	—	250*	—
Chlorobenzene	Human Health + — Fish	—	—	—	—	—	—	—	~~21~~ 1.6*[e]
	Human Health + — F & W	—	—	—	—	—	—	—	130[f]
	MCL	—	—	—	—	—	—	100	—
Chlorodibromo–methane	Human Health — F & W	—	—	—	—	—	—	—	~~4.1~~ 4.0[f]
	Human Health — Fish	—	—	—	—	—	—	—	~~340~~ 130[e]
Chloroform	Human Health — F & W	—	—	—	—	—	—	—	57[f]
	Human Health — Fish	—	—	—	—	—	—	—	4700[e]
Chloropyrifos	Chronic	.041	—	.041	.041	.041	.041	—	—
	Acute	.083	—	.083	.083	.083	.083	—	—
Chromium (VI)	Chronic	40	—	~~40~~ 11	~~200~~ 11	~~200~~ 11	10	—	—
	Acute	60	—	~~60~~ 16	~~300~~ 16	~~300~~ 16	15	—	—
	Human Health + — Fish	—	—	—	—	—	—	—	3365[e]
	MCL	—	—	—	—	—	—	100	—
Copper	Chronic	20	—	~~35~~ 9.3[i]	~~55~~ 9.3[i]	~~55~~ 9.3[i]	10	—	—
	Acute	30	—	~~60~~ 14[i]	~~90~~ 14[i]	~~90~~ 14[i]	20	—	—
	Human Health + — Fish	—	—	—	—	—	—	—	1000[e]
	Human Health + — F & W	—	—	—	—	—	—	—	1300[f]

Cyanide	Chronic	5	—	~~10~~ 5.2	~~10~~ 5.2	~~10~~ 5.2	10	—	—
	Acute	20	—	~~45~~ 22	~~45~~ 22	~~45~~ 22	45	—	—
	Human Health + — F & W	—	—	—	—	—	—	—	~~700~~ 140(f)
	Human Health — Fish	—	—	—	—	—	—	—	140(e)
Dalapon	MCL	—	—	—	—	—	—	200	—
Dibromochloro propane	MCL	—	—	—	—	—	—	.2	—
4,4–DDT ++	Chronic	.001	—	.001	~~.029~~ .001	~~.029~~ .001	.001	—	—
	Acute	.9	—	~~.8~~ 1.1	~~.95~~ 1.1	~~.95~~ 1.1	.55	—	—
	Human Health — Fish	—	—	—	—	—	—	—	~~.0059~~ .0022(e)
	Human Health — F & W	—	—	—	—	—	—	—	~~.0059~~ .0022(f)
o–Dichloro–benzene	MCL	—	—	—	—	—	—	600	—
para–Dichloro–benzene	Human Health + — F & W	—	—	—	—	—	—	—	~~400~~ 63(f)
	Human Health + — Fish	—	—	—	—	—	—	—	~~2.6*~~ 190(e)
3,3–Dichloro–benzidine	Human Health — Fish	—	—	—	—	—	—	—	~~.2~~ .28(e)
	Human Health — F & W	—	—	—	—	—	—	—	~~.4~~ .21(f)
Dichlorobromo–methane	Human Health — F & W	—	—	—	—	—	—	—	~~5.6~~ 5.5(f)
	Human Health — Fish	—	—	—	—	—	—	—	~~460~~ 170(e)
1,2–Dichloro–ethane	Human Health — F & W	—	—	—	—	—	—	—	3.8(f)
	Human Health — Fish	—	—	—	—	—	—	—	~~986~~ 370(e)
1,1–Dichloro–ethylene	Human Health — F & W	—	—	—	—	—	—	—	~~.57~~ 330(f)
	Human Health — Fish	—	—	—	—	—	—	—	~~32~~ 7.1*(e)
cis–1,2–Dichloro–ethylene	MCL	—	—	—	—	—	—	70	—
~~trans–1,2~~ 1,2–trans–Dichloroethylene	Human Health + — F & W	—	—	—	—	—	—	—	~~700~~ 10*(f)
	Human Health — Fish	—	—	—	—	—	—	—	140(e)
Dichloromethane	MCL	—	—	—	—	—	—	5	—
1,2–Dichloro–propane	Human Health — F & W	—	—	—	—	—	—	—	~~5.2~~ 5.0(f)
	Human Health — Fish	—	—	—	—	—	—	—	150(e)
Di(2–ethylhex–yl)adipate	MCL	—	—	—	—	—	—	400	—

~~Di~~ bis(2–ethylhex– yl)phthalate	Human Health — F & W	—	—	—	—	—	—	—	~~18~~ 12[f]
	Human Health — Fish	—	—	—	—	—	—	—	22[e]
Dieldrin	Chronic	.056	—	.056	.056	.056	.056	—	—
	Acute	.24	—	.24	.24	.24	.24	—	—
	Human Health — Fish	—	—	—	—	—	—	—	~~.0014~~ .00054[e]
	Human Health — F & W	—	—	—	—	—	—	—	~~.0014~~ .00052[f]
Dinoseb	MCL	—	—	—	—	—	—	7	—
2,3,7,8–TCDD (Dioxin)	Human Health — F & W	—	—	—	—	—	—	—	~~1.3^{-7}~~ 5.0^{-8}[f]
	Human Health — Fish	—	—	—	—	—	—	—	~~.00014‡~~ 5.1^{-8}[e]
Diquat	MCL	—	—	—	—	—	—	20	—
2,4–D	Human Health + — F & W	—	—	—	—	—	—	—	100[f]
Endosulfan[b]	Chronic	.056	—	~~.15~~ .056	~~.15~~ .056	~~.15~~ .056	.15	—	—
	Acute	.11	—	~~.3~~ .22	~~.3~~ .22	~~.3~~ .22	.3	—	—
	Human Health + — Fish	—	—	—	—	—	—	—	~~240~~ 89[e]
	Human Health + — F & W	—	—	—	—	—	—	—	~~110~~ 62[f]
Endothall	MCL	—	—	—	—	—	—	100	—
Endrin	Chronic	.05	—	.036	.036	.036	.036	—	—
	Acute	.12	—	.086	.086	.086	.086	—	—
	Human Health + — Fish	—	—	—	—	—	—	—	~~.81~~ .06[e]
	Human Health + — F & W	—	—	—	—	—	—	—	~~.76~~ .059[f]
Ethylbenzene	Human Health + — F & W	—	—	—	—	—	—	—	~~3100~~ 530[f]
	Human Health — Fish	—	—	—	—	—	—	—	2100[e]
Ethylene dibromide	MCL	—	—	—	—	—	—	.05	—
Fluoride	MCL	—	—	—	—	—	—	4000	—
Glyphosate	MCL	—	—	—	—	—	—	700	—
Heptachlor	Chronic	.0038	—	.0038	~~.01~~ .0038	~~.01~~ .0038	.0038	—	—
	Acute	.38	—	~~.38~~ .52	~~.38~~ .52	~~.38~~ .52	.38	—	—
	Human Health — Fish	—	—	—	—	—	—	—	~~.002~~ .00079[e]
	Human Health — F & W	—	—	—	—	—	—	—	~~.0021~~ .00079[f]
Heptachlor epoxide	Chronic	.0038	—	.0038	.0038	.0038	.0038	—	—
	Acute	.52	—	.52	.52	.52	.52	—	—
	Human Health — F & W	—	—	—	—	—	—	—	~~.001~~ .00039[f]

	Human Health — Fish	—	—	—	—	—	—	—	.00039(e)
Hexachloro–benzene	Human Health — F & W	—	—	—	—	—	—	—	~~.0075~~ .0028(f)
	Human Health — Fish	—	—	—	—	—	—	—	.0029(e)
~~γ–Hexachloro–cyclohexane gamma–BHC~~ (Lindane)	Chronic	N/A	—	N/A	N/A	N/A	N/A	—	—
	Acute	.95	—	.95	.95	.95	.95	—	—
	Human Health + — Fish	—	—	—	—	—	—	—	~~.63~~ 1.8(e)
	Human Health + — F & W	—	—	—	—	—	—	—	~~.19~~ .98(f)
Hexachloro–cyclopentadiene	Human Health — F & W	—	—	—	—	—	—	—	~~240~~ 40(f)
	Human Health — Fish	—	—	—	—	—	—	—	1100(e)
Lead	Chronic	3	—	~~30~~ 3.2(j)	~~80~~ 3.2(j)	~~80~~ 3.2(j)	3	—	—
	Acute	80	—	~~200~~ 81.7(j)	~~750~~ 81.7(j)	~~750~~ 81.7(j)	80	—	—
	MCL	—	—	—	—	—	—	50	—
Mercury (II)	Chronic	3.5	—	~~2.1~~ .9	~~3.7~~ .9	~~3.7~~ .9	.91	—	—
	Acute	6.5	—	~~4.0~~ 1.64	~~6.9~~ 1.64	~~6.9~~ 1.64	1.7	—	—
	Human Health + — Fish	—	—	—	—	—	—	—	.15(e)
	Human Health + — F & W	—	—	—	—	—	—	—	.05(f)
Methoxychlor	Human Health + — F & W	—	—	—	—	—	—	—	100(f)
Nickel	Chronic	350	—	~~650~~ 52(k)	~~750~~ 52(k)	~~750~~ 52(k)	150	—	—
	Acute	3250	—	~~5800~~ 470(k)	~~7000~~ 470(k)	~~7000~~ 470(k)	1400	—	—
	Human Health + — Fish	—	—	—	—	—	—	—	~~4584~~ 4600(e)
	Human Health + — F & W	—	—	—	—	—	—	—	610(f)
Nitrate as N	MCL	—	—	—	—	—	—	10*	—
Nitrate + Nitrite as N	MCL	—	—	—	—	—	—	10*	—
Nitrite as N	MCL	—	—	—	—	—	—	1*	—
Oxamyl (Vydate)	MCL	—	—	—	—	—	—	200	—
Parathion	Chronic	.013	—	.013	.013	.013	.013	—	—
	Acute	.065	—	.065	.065	.065	.065	—	—
Pentachlorophenol (PCP)	Chronic	(d)	—	(d)	(d)	(d)	(d)	—	—
	Acute	(d)	—	(d)	(d)	(d)	(d)	—	—
	Human Health — Fish	—	—	—	—	—	—	—	~~82~~ 30(e)
	Human Health — F & W	—	—	—	—	—	—	—	~~.28~~ 2.7(f)
Picloram	MCL	—	—	—	—	—	—	500	—

Polychlorinated Biphenyls (PCBs)	Chronic	.014	—	.014	~~1~~ .014	~~1~~ .014	.014	—	—
	Acute	2	—	2	2	2	2	—	—
	Human Health — Fish	—	—	—	—	—	—	—	~~.0004~~ .00064[e]
	Human Health — F & W	—	—	—	—	—	—	—	~~.0017~~ .00064[f]
Polynuclear Aromatic Hydrocarbons (PAHs)**	Chronic	.03	—	.03	3	3	.03	—	—
	Acute	30	—	30	30	30	30	—	—
	Human Health — Fish	—	—	—	—	—	—	—	~~.3~~ .18[e]
	Human Health — F & W	—	—	—	—	—	—	—	~~.044~~ .038[f]
Phenols	Chronic	50	—	50	50	50	50	—	—
	Acute	1000	—	2500	2500	2500	1000	—	—
	Human Health + — Fish	—	—	—	—	—	—	—	~~300~~ 1700*[e]
	Human Health + — F & W	—	—	—	—	—	—	—	21*[f]
Selenium ~~(VI)~~	Chronic	10	—	~~125~~ 5	~~125~~ 5	~~125~~ 5	70	—	—
	Acute	15	—	~~175~~ 19.3	~~175~~ 19.3	~~175~~ 19.3	100	—	—
	Human Health + — F & W	—	—	—	—	—	—	—	170[f]
	Human Health + — Fish	—	—	—	—	—	—	—	4200[e]
Silver	Chronic	N/A	—	N/A	N/A	N/A	N/A	—	—
	Acute	30	—	~~100~~ 4	~~100~~ 4	~~100~~ 4	4	—	—
	MCL	—	—	—	—	—	—	50	—
2,4,5–TP (Silvex)	MCL	—	—	—	—	—	—	10	—
Simazine	MCL	—	—	—	—	—	—	4	—
Styrene	MCL	—	—	—	—	—	—	100	—
Tetrachloro–ethylene	Human Health — F & W	—	—	—	—	—	—	—	~~8~~ 6.9[f]
	Human Health — Fish	—	—	—	—	—	—	—	33[e]
Thallium	Human Health + — F & W	—	—	—	—	—	—	—	~~1.7~~ .24[f]
	Human Health + — Fish	—	—	—	—	—	—	—	.47[e]
Toluene	Chronic	50	—	50	150	150	50	—	—
	Acute	2500	—	2500	7500	7500	2500	—	—
	Human Health + — Fish	—	—	—	—	—	—	—	~~300~~ 15*[e]
	Human Health + — F & W	—	—	—	—	—	—	—	~~6800~~ 1300[f]
Total Residual Chlorine (TRC)	Chronic	10	—	~~20~~ 11	~~25~~ 11	~~25~~ 11	10	—	—
	Acute	35	—	~~35~~ 19	~~40~~ 19	~~40~~ 19	20	—	—
Toxaphene	Chronic	.037	—	~~.037~~ .002	~~.037~~ .002	~~.037~~ .002	.037	—	—
	Acute	.73	—	.73	.73	.73	.73	—	—
	Human Health — Fish	—	—	—	—	—	—	—	~~.0075~~ .0028[e]

	Human Health — F & W	—	—	—	—	—	—	—	~~.0073~~ .0028[f]
1,2,4–Trichloro– benzene	MCL	—	—	—	—	—	—	70	—
1,1,1–Trichloro– ethane	MCL	—	—	—	—	—	—	200	—
	Human Health + — Fish	—	—	—	—	—	—	—	173*[e]
1,1,2–Trichloro– ethane	Human Health — F & W	—	—	—	—	—	—	—	6[f]
Trichloroethylene (TCE)	Chronic	80	—	80	80	80	80	—	—
	Acute	4000	—	4000	4000	4000	4000	—	—
	Human Health — Fish	—	—	—	—	—	—	—	~~807~~ 300[e]
	Human Health — F & W	—	—	—	—	—	—	—	~~27~~ 25[f]
Trihalomethanes (total)[c]	MCL	—	—	—	—	—	—	80	—
Vinyl Chloride	Human Health — F & W	—	—	—	—	—	—	—	~~20~~ .25[f]
	Human Health — Fish	—	—	—	—	—	—	—	~~5250~~ 240[e]
Xylenes (total)	MCL	—	—	—	—	—	—	10*	—
Zinc	Chronic	200	—	~~450~~ 120[l]	~~2000~~ 120[l]	~~2000~~ 120[l]	100	—	—
	Acute	220	—	~~500~~ 120[l]	~~2200~~ 120[l]	~~2200~~ 120[l]	110	—	—
	Human Health + — Fish	—	—	—	—	—	—	—	~~5000~~ 26*[e]
	Human Health + — F & W	—	—	—	—	—	—	—	~~9100~~ 7.4*[f]

* units expressed as milligrams/liter

** to include the sum of known and suspected carcinogenic PAHs (includes benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3–cd)pyrene)

† expressed as nanograms/liter

\+ represents the noncarcinogenic human health parameters

++ The concentrations of 4,4–DDT or its metabolites; 4,4–DDE and 4,4–DDD, individually shall not exceed the human health criteria.

(a) units expressed as million fibers/liter (longer than 10 micrometers)

(b) includes alpha–endosulfan, beta–endosulfan, and endosulfan sulfate in combination or as individually measured

(c) The sum of the four trihalomethanes (bromoform [tribromomethane], chlorodibromomethane, chloroform [trichloro–methane], and dichlorbromomethane) may not exceed the MCL.

(d) Class B numerical criteria ~~are~~ for pentachlorophenol are a function of pH using the equation:
Criterion (∝g/l) = $e^{[1.005(pH) - x]}$, where e = 2.71828 and x varies according to the following table:

	B(CW1)	B(CW2)	B(WW–1)	B(WW–2)	B(WW–3)	B(LW)
Acute	3.869	—	4.869	4.869	4.869	4.869
Chronic	4.134	—	5.134	5.134	5.134	5.134

(e) This Class HH criterion would be applicable to any Class B(LW), B(CW1), B(WW–1), B(WW–2), or B(WW–3) water body that is also designated Class HH.

(f) This Class HH criterion would be applicable to any Class C water body that is also designated Class HH.

(g) inorganic form only

(h) Class B(WW–1), B(WW–2), and B(WW–3) criteria listed in main table are based on a hardness of 100 mg/l (as $CaCO_3$ (mg/l)). Numerical criteria (∝g/l) for cadmium are a function of hardness (as $CaCO_3$ (mg/l)) using the equation for each use according to the following table:

	B(WW–1)	B(WW–2)	B(WW–3)
Acute	$e^{[1.0166 Ln(Hardness) - 3.924]}$	$e^{[1.0166 Ln(Hardness) - 3.924]}$	$e^{[1.0166 Ln(Hardness) - 3.924]}$
Chronic	$e^{[0.7409 Ln(Hardness) - 4.719]}$	$e^{[0.7409 Ln(Hardness) - 4.719]}$	$e^{[0.7409 Ln(Hardness) - 4.719]}$

(i) Class B(WW–1), B(WW–2), and B(WW–3) criteria listed in main table are based on a hardness of 100 mg/l (as $CaCO_3$ (mg/l)). Numerical criteria (∝g/l) for copper are a function of hardness ($CaCO_3$ (mg/l)) using the equation for each use according to the following table:

	B(WW–1)	B(WW–2)	B(WW–3)
Acute	$e^{[0.9422 Ln(Hardness) - 1.700]}$	$e^{[0.9422 Ln(Hardness) - 1.700]}$	$e^{[0.9422 Ln(Hardness) - 1.700]}$
Chronic	$e^{[0.8545 Ln(Hardness) - 1.702]}$	$e^{[0.8545 Ln(Hardness) - 1.702]}$	$e^{[0.8545 Ln(Hardness) - 1.702]}$

(j) Class B(WW–1), B(WW–2), and B(WW–3) criteria listed in main table are based on a hardness of 100 mg/l (as $CaCO_3$ (mg/l)). Numerical criteria (∝g/l) for lead are a function of hardness ($CaCO_3$ (mg/l)) using the equation for each use according to the following table:

	B(WW–1)	B(WW–2)	B(WW–3)
Acute	$e^{[1.2731 Ln(Hardness) - 1.46]}$	$e^{[1.2731 Ln(Hardness) - 1.46]}$	$e^{[1.2731 Ln(Hardness) - 1.46]}$
Chronic	$e^{[1.2731 Ln(Hardness) - 4.705]}$	$e^{[1.2731 Ln(Hardness) - 4.705]}$	$e^{[1.2731 Ln(Hardness) - 4.705]}$

(k) Class B(WW–1), B(WW–2), and B(WW–3) criteria listed in main table are based on a hardness of 100 mg/l (as $CaCO_3$ (mg/l)). Numerical criteria (∝g/l) for nickel are a function of hardness ($CaCO_3$ (mg/l)) using the equation for each use according to the following table:

	B(WW–1)	B(WW–2)	B(WW–3)
Acute	$e^{[0.846 Ln(Hardness) + 2.255]}$	$e^{[0.846 Ln(Hardness) + 2.255]}$	$e^{[0.846 Ln(Hardness) + 2.255]}$
Chronic	$e^{[0.846 Ln(Hardness) + 0.0584]}$	$e^{[0.846 Ln(Hardness) + 0.0584]}$	$e^{[0.846 Ln(Hardness) + 0.0584]}$

(l) Class B(WW–1), B(WW–2), and B(WW–3) criteria listed in main table are based on a hardness of 100 mg/l (as $CaCO_3$ (mg/l)). Numerical criteria (∝g/l) for zinc are a function of hardness ($CaCO_3$ (mg/l)) using the equation for each use according to the following table:

	B(WW–1)	B(WW–2)	B(WW–3)
Acute	$e^{[0.8473 Ln(Hardness) + 0.884]}$	$e^{[0.8473 Ln(Hardness) + 0.884]}$	$e^{[0.8473 Ln(Hardness) + 0.884]}$
Chronic	$e^{[0.8473 Ln(Hardness) + 0.884]}$	$e^{[0.8473 Ln(Hardness) + 0.884]}$	$e^{[0.8473 Ln(Hardness) + 0.884]}$